

Preliminary Feasibility Testing of the BRIC Brine Water Recovery Concept

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The Brine Residual In-Containment (BRIC) concept was developed as a new technology to recover water from spacecraft wastewater brines. Such capability is considered critical to closing the water loop and achieving a sustained human presence in space. The intention of the BRIC concept is to increase the robustness and efficiency of the dewatering process by performing drying inside the container used for the final disposal of the residual brine solid. Recent efforts in the development of BRIC have focused on preliminary feasibility testing using a laboratory-assembled pre-prototype unit. Observations of the drying behavior of actual brine solutions processed under BRIC-like conditions has been of particular interest. To date, experiments conducted with three types of analogue spacecraft wastewater brines have confirmed the basic premise behind the proposed application of in-place drying for these solutions. Specifically, the dried residual mass from these solutions have tended to exhibit characteristics of adhesion and flow that are expected to continue to challenge process stream management in spacecraft brine dewatering system designs. Yet, these same characteristics may favor the development of capillary- and surface-tension-based approaches envisioned as part of an ultimate microgravity-compatible BRIC design. In addition, preliminary feasibility testing of the BRIC pre-prototype confirmed that high rates of water recovery, up to 98% of the available brine water, may be possible while still removing the majority of the brine contaminants from the influent brine stream. These and other observations from testing are reported.

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